

## WHAT IS CLAIMED IS:

1. A PEM fuel cell usable in a reformat fuel stream containing diluted hydrogen fuel with CO as an impurity and with added air, comprising:

a polymer electrolyte membrane having an electrocatalytic surface formed from an electrocatalyst mixed with the polymer and bonded on an anode side of the membrane; and

an anode backing formed of a porous electrically conductive material and having a first surface abutting the electrocatalytic surface and a second surface facing away from the membrane, where the second surface has an oxidation catalyst layer effective to catalyze the oxidation of CO by oxygen present in the fuel stream where at least the layer of oxidation catalyst is formed of a non-precious metal oxidation catalyst selected from the group consisting of Cu, Fe, Co, Tb, W, Mo, Sn, and oxides thereof.

2. A PEM fuel cell system according to Claim 1, where the electrocatalyst is selected from the group consisting of Pt and Pt/Ru alloy.

3. A PEM fuel cell system according to Claim 1, wherein the electrocatalyst is Pt.

4. A PEM fuel cell system according to Claim 1, wherein the layer of oxidation catalyst further includes a hydrophobic material.

a polymer electrolyte membrane having an electrocatalytic surface formed from an electrocatalyst mixed with the polymer and bonded on an anode side of the membrane; and

an anode backing formed of a porous electrically conductive material and having a first surface abutting the electrocatalytic surface and a second surface facing away from the membrane, where the second surface has an oxidation catalyst layer effective to catalyze the oxidation of CO by oxygen present in the fuel stream where at least the layer of oxidation catalyst is formed from a metal having at least two oxidation states in the range of 1-4.